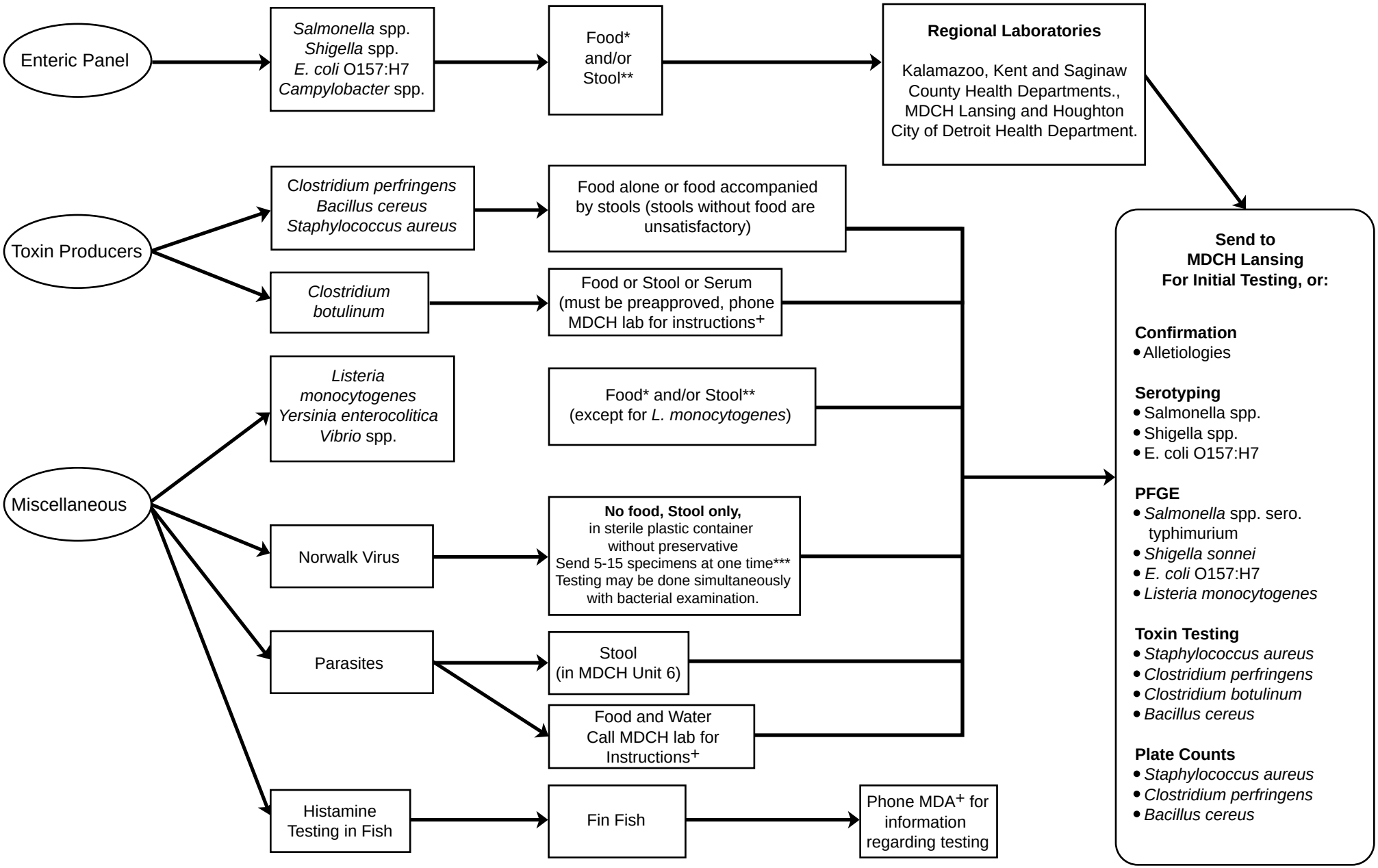
Specimens for Laboratory Analysis in a Foodborne Outbreak Investigation
Hypothesis Must be Developed Prior to Submitting Specimens for Examination



* Foods: 50-100 grams (4oz) of implicated food in sterile container; send to lab on wet ice by courier. Do Not Freeze.
* * Stools: 10 Grams (size of a walnut) in MDCH Unit 1: send to lab by courier mail.
* * * Required by laboratory for best use of PCR examination.
+ See Module 8 for Phone Contact List

I. Task List

- Collect leftovers of implicated foods under suspicion.
- Collect original food product from the suspect facility.
- Collect individual ingredients if complete food product is unavailable.
- Collect clinical specimens from ill cases.
- Notify appropriate laboratory as to arrival of specimens.
- Submit specimens to the laboratory.

II. Notes

- Diagnosis of most diseases can be confirmed if the etiological agent is isolated and identified from specimens obtained from ill persons.

- The adequacy and condition of food and clinical specimens, collected during the investigation of a foodborne illness outbreak, are of primary importance. A properly collected, preserved and transported specimen will provide the best possible laboratory information for use in resolving and outbreak and preventing further spread of illness.

- The Michigan Department of Community Health laboratory system is responsible for testing samples collected as part of foodborne illness investigations (with the exception of fish for histamine testing). MDCH has developed a regional laboratory system to improve and increase assistance to the LHD. This system allows for expert analysis and faster turnaround because of the proximity of the laboratories to the investigation sites. (See pg. 4-5 for the appropriate regional laboratory)

- The Michigan Department of Agriculture is responsible for testing samples collected as part of a routine regulatory inspection.

  - Exception: Histamine testing for fish.

- Preliminary epidemiological associations will be required prior to submitting specimens for examination. The laboratory will examine the most likely suspect foods first. (See pg. 4)

  - Some foodborne illness investigations will have the causative agent determined by epidemiological means if specimens are unavailable for testing.

- Use the appropriate kit for the testing desired. (See pg. 11)

- Encourage health care providers, and hospitals, to collect stool specimens from potential foodborne illness cases.

III. Tasks List Related Information

- Collect leftovers of implicated foods under suspicion.
  - If home-prepared foods are under suspicion, collect leftovers of suspect foods eaten in last 72 hours. (pg. 7-8)
- Collect original foods product from the suspect facility.
  - This food should be of the same lot, prepared at the same time as the suspect food item. (pg. 7-8)
- Collect individual ingredients if complete food product is unavailable.
- Collect clinical specimens from ill cases. (pg. 9)
  - Vomitus is not an acceptable specimen for laboratory examination.
- Notify appropriate laboratory as to arrival of specimens. (pg. 5)
- Submit all specimens to the laboratory for analysis.
  - Submit stool and food specimens according to the lab flowchart and testing chart. (See pg. 4)
  - Food products should be submitted to the laboratory in the appropriate manner. (See pg. 7-8)
  - Aseptic – Don't introduce cross-contamination. Use different utensils for each food.
  - Sterile – Collect in sterile environment.

Testing Routinely Performed at MDCH and MDA

Category of Illness	Incubation Period	Predominant Signs and Symptoms	Test For:
Upper Gastrointestinal Tract (nausea; vomiting) signs and symptoms occurring first or predominantly	1 to 6 hours mean, 2 to 4 hours	Nausea; vomiting; retching; diarrhea; abdominal pain; prostration	*Staphylococcus aureus* and its enterotoxins, *Bacillus cereus*
Lower Gastrointestinal Tract (abdominal cramps; diarrhea) signs and symptoms occurring first or predominant	8 to 22 hours mean, 10 to 12 hours	Abdominal cramps; diarrhea	*Clostridium perfringens, Bacillus cereus*
	12 to 71 hours mean, 18 to 36 hours	Abdominal cramps; diarrhea; vomiting; fever; chills; malaise	*Salmonella* spp., *Shigella* spp., *E. coli* O157:H7, *Yersinia* spp., *Campylobacter* spp., *Vibrio* spp.
	1.5 day to 3 days	Diarrhea; fever; vomiting; abdominal pain; possibly respiratory symptoms	Norwalk virus
	1 to 11 days median 7 days	Fatigue; diarrhea	*Cyclospora cayetanensis*
	2 to 28 days median 7 days	Diarrhea; nausea; vomiting; fever	*Cryptosporidium parvum*
	1 to 6 weeks	Mucoid diarrhea (fatty stools); abdominal pain; weight loss	*Giardia lamblia*
Neurological (visual disturbances; vertigo; tingling; paralysis)	12 to 72 hours	Vertigo; double or blurred vision; loss of reflex to light; difficulty swallowing, speaking or breathing; dry mouth; weakness; respiratory paralysis	*Clostridium botulinum* and its neurotoxins
Allergic type (facial flushing; itching)	Less than 1 hour	Headache; dizziness; nausea; vomiting, peppery taste in mouth; burning in throat; facial swelling and flushing; stomach pain; itching of skin	Histamine (Scromboid poisoning)
Generalized Infection	15 to 50 days median 28 days	Jaundice; dark urine; fatigue; anorexia; nausea	hepatitis A virus
	2 to 6 weeks	Meningitis; meningoencephalitis; invasive disease; neonatal sepsis; abortions; stillbirths	*Listeria monocytogenes*

Other etiologies may be considered as the causative agent of foodborne illness. Testing for these may be done on an individual basis by contacting the MDCH or MDA laboratory.

Michigan Department of Community Health
Regional Laboratory System

Regional Laboratory	Participants	Lab Manager / Technical Consultant	Laboratory Director
Region I MDCH Laboratory Lansing, MI	Jackson County Health Dept. Lapeer County Health Dept. Lenawee County Health Dept. Livingston County Health Dept. Monroe County Health Dept. Washtenaw County Health Dept. Macomb County Health Dept.	Trish Somsel, Dr. P.H. (Interim) (517) 335-8067	James Rudrik, Ph. D. (517) 335-8183
Region II Saginaw County Health Dept. Laboratory Saginaw, MI	Central MI District Health Dept. District Health Dept #2 Huron County Health Dept. Saginaw County Health Dept. Sanilac County Health Dept. Tuscola County Health Dept.	Tammy Theisen (989) 758-3825	William Sottile, Ph.D. (906) 482-3011
Region III Kalamazoo Co. Human Services Laboratory Kalamazoo, MI	Barry-Eaton District Health Dept. Berrien County Health Dept. Branch-Hillsdale-St. Joseph Community Health Dept. Cass County Health Dept. Kalamazoo Co. Human Services Van Buren County Health Dept.	Cindy Overkamp (616) 373-5359	Jeff Massey, Dr. P.H. (517) 335-8850
Region IV Kent County Health Dept. Laboratory Grand Rapids, MI	Benzie-Leelanau District Health Dept. Grand Traverse County Health Dept. Ottawa County Health Dept. Ionia County Health Dept. Kent County Health Dept. District Health Dept #10	Ken Terpstra (616) 336-3475	Frances Pouch Downes, Dr P.H. (517) 335-8063
Region V MDCH UP Laboratory Houghton, MI	Dickinson-Iron District Health Dept. Delta-Menominee District Health Dept. Marquette County Health Dept. Luce-Mackinac-Alger-Schoolcraft District Health Dept. District Health Dept. #4 Western U.P. District Health Dept. Chippewa County Health Dept. Northwest MI Community Health Agency	William Sottile, Ph.D. (906) 482-3011	William Sottile, Ph.D. (906) 482-3011
Region VI MDCH Laboratory Lansing, Michigan	Mid-Michigan District Health Dept. Shiawassee County Health Dept. Ingham County Health Dept.	Trish Somsel, Dr. P.H. (Interim) (517) 335-8067	Duane Newton, Ph.D. (517) 335-8099
City of Detroit City of Detroit Health Dept. Laboratory	City of Detroit	Aloysius Hanson, Ph.D. (313) 876-4223	Aloysius Hanson, Ph.D. (313) 876-4223

County Health Departments not participating in the regional system should contact the nearest regional laboratory if testing is needed to assist in a foodborne illness investigation.

Collection and Submission of Food Samples Associated with Foodborne Illness

The adequacy and condition of food samples, collected during investigation of a foodborne illness outbreak, are of primary importance. A properly collected, preserved and transported specimen will provide the best possible laboratory information for use in resolving the cause of an outbreak and preventing further spread of disease.

Food samples should be taken as soon as an outbreak is suspected. All specimens should be collected aseptically, with sterile implements, wearing sterile gloves and placing the specimen in a sterile container. All specimens should be held, refrigerated, at the local health department until the actual suspected food has been determined. Foods submitted to the laboratory for analysis, should be the exact food implicated in the outbreak investigation. If the implicated food is unavailable, an associated sample (same lot or batch as the implicated food) may be sampled.

Solid food item

1. Whenever possible samples should be submitted in the original container as contamination of a sample may occur during manipulation. Ship intact packages to the laboratory for proper analysis. Containers include:

   - Pizza in original box
   - Leftovers in restaurant box or home storage container
   - Ingredients in original packaging

2. If a large amount of the food is available, a representative sample should be taken. Taking a sample from the geometric center and other locations of the food item does this. Using a sterile implement transfer this sample to a sterile, leakproof container (e.g., screwcapped jar, ziplock bag). Foods may include:

   - Ham
   - Puddings
   - Casseroles

3. Label the specimen with the outbreak identifier and the date of collection.

4. All foods should be held under refrigeration at the local health department until transported to the laboratory for examination. **Do not freeze foods** as it causes a significant loss of viability of certain organisms. If the food sample was frozen when collected, keep it frozen until it reaches the laboratory.

5. When shipping the specimen to the laboratory, pack in refrigerant (wet ice) and transport via the most rapid and convenient means available (e.g., courier, bus, express mail, etc.).

Liquid Food or Beverage

1. Whenever possible samples should be submitted in the original container as contamination of a sample may occur during manipulation. Containers may include:

   - Milk carton
   - Juice bottle

2. Stir or shake liquid.

3. Pour or ladle the food item, with a sterile implement, into a sterile **leakproof** container (e.g., screwcapped jar)

4. Label the specimen with the outbreak identifier and the date of collection.

5. All foods should be held under refrigeration at the local health department until transported to the laboratory for examination. Do not freeze foods as it causes a significant loss of viability of certain organisms. If the food sample was frozen when collected, keep it frozen until it reaches the laboratory.

6. When shipping the specimen to the laboratory, pack in refrigerant (wet ice) and transport via the most rapid and convenient means available (e.g., courier, bus, express mail, etc.).

Determination of Testing Procedures

The foodborne illness investigation team, at the local health department, will determine what tests will be performed prior to the arrival of specimens at the laboratory. Determination will be made with the following criteria:

1. Summary of predominant symptoms among the cases.

2. Time interval between consumption of the suspected food and the onset of illness (incubation time).

3. Duration of symptoms.

4. Results of any human specimens collected and tested.

The state and regional laboratories are committed to supporting food safety and ensuring the quality of the food supply. However, laboratory procedures for the isolation of microbial foodborne disease agents are complicated, expensive and time consuming. It is important that the laboratory has good epidemiological information before analyzing food samples submitted for examination.

Collection and Submission of Fecal Samples

A. Collection and Submission of Specimens for Detection of Bacteria or Ova and Parasites

1. Collect the feces as follows: **Do not pass the feces directly into the tube. Do not urinate on the feces or into the tube. Do not pass the feces into a toilet.** The stool (feces) should be passed into a clean, dry, container that can be discarded after collection of feces. Use a bedpan or a clean, dry, plastic container such as a margarine tub, clean, dry, wide mouth jar or a clean, dry, milk carton with the top cut off.
2. Wash hands before and after handling fecal specimen.
3. Ensure that the proper transport tube and Test Requisition form are properly labeled with the patient's name and that the test requisition has the desired test requested. (See example of MDCH form DCH-0583 or Region Lab form DCH 0567).
4. Wrap specimen in absorbent paper such as a paper towel and place in the aluminum can and secure cap.
5. Wrap the test requisition around outside of aluminum can.
6. Place aluminum can into cardboard mailer container and secure the cap with tape.
7. Apply return address and clinical specimen label to cardboard container and ship by the most rapid and convenient means available (e.g., express mail, courier, bus etc.) to MDCH in Lansing or your Regional Laboratory.

B. Handling and Transport of Specimens for detection of Viruses (Performed only at MDCH)

1. Obtain properly collected stool specimens from patients within 48-72 hours of onset of symptoms. (See Instructions for Collection of Fecal Samples above).
2. Make sure that samples for viral detection are collected in sterile container with **no preservative.**
3. Ensure that transport container and Test Requisition form are properly labeled with the patient's name and that the test requisition has the desired test requested. (See example of MDCH form DCH-0583--formally FB-200).
4. Place container in plastic bag and seal so sample does not leak during transport.
5. Refrigerate sample until transported to MDCH.
6. For transport, place the container in a Styrofoam or similar insulated chest containing ice packs. Specimen must be kept cold during transport.
7. Place the requisition form in a plastic bag in the cooler.
8. Ship by the most rapid and convenient means available (e.g., expressmail, courier, bus, etc.) to MDCH in Lansing.

INSTRUCTIONS FOR COLLECTION & SUBMISSION OF SERUM

Michigan Department of Community Health
And
Michigan Regional Laboratories

IMPORTANT: If the specimen container is received leaking, not properly labeled, test requisition not completed or a specimen label does not match test requisition, the specimen will not be tested!

NOTE: The 12 x 55 mm tubes provided are not sterile and must not be used for the submission of CSF, throat swabs or other specimens for bacterial or viral culture.

- Perform venipuncture. After sufficient clotting (one hour at room temperature), centrifuge the whole blood to separate cells from serum.

- Transfer serum to the plastic skirted-cap tube(s) provided (minimum volume of 2.5 ml). Specimens less than 2.5 ml are unsatisfactory and will not be tested.

- Label tube(s) with the same name/unique identifier used on the test requisition(s).

- Record the name/unique identifier on the tube/requisition for your records. You will use it to link the specimen to the patient.

- Refrigerate serum at two to eight degrees centigrade until ready to ship to the laboratory. When ready to ship, place no more than two tubes that are labeled with the same name or unique identifier as used on the test requisitions, wrapped in absorbent material such as paper towel or tissue, into aluminum screw-capped can and tighten the cap.

- Place aluminum can with completed test requisition(s) into screw-capped cardboard container and secure tightened cap with tape.

- Complete and apply return orange address and clinical specimen label to cardboard container and ship by the most rapid and convenient means available (e.g., courier, bus, first class, priority or express mail etc.).

Contents of MDCH Specimen Kits

MDCH Unit #46 Foodborne Illness and/or Norwalk Virus
(Norwalk virus by special request only)

5	Container, plastic, sterile, 4.5 ounce, for solid food and/or liquid specimens
5	Plastic bags, WhirlPacks, for solid food specimens
5	Medium, Cary Blair, fecal transport for specimens for bacterial examination*
5	Mailer, dual, for Cary Blair transport vial
5	Tube w/cap, centrifuge, sterile, 50ml, for fecal specimens for viral examination
5	Mailer, dual, for transport of centrifuge tube
5	Pipette, transfer, sterile, for collection of food specimens
5	Spatula, sterile, for collection of food specimen
10	Bags, plastic, for transport of clinical specimens and/or food specimens
1	Box, corrugated
5	Mailer, Styrofoam, for food transport
5	Ice, blue, for food transport
15	Requisition, DCH-0583, for specimens submitted to MDCH
15	Requisition, DCH-0567, for specimens submitted to regional laboratories
1	Label, shipping, for clinical specimens
1	Directions, DCH-0596, for collection of clinical specimens for bacterial exam
1	Directions, DCH-0883, for collection of food specimens
1	Directions, DCH-0723, for collection of clinical specimens for viral examination

MDCH Unit #1 Enteric Bacteria Culture

1	Medium, Cary Blair, fecal transport*
1	Mailer, dual, for shipping transport medium w/specimen
1	Bag, plastic, for shipping transport medium w/specimen
1	Requisition, DCH-0583, for specimens submitted to MDCH
1	Directions, DCH-0596, for collection of clinical specimens
1	Label, shipping

MDCH Unit #6 Parasitology

1	Medium, Formalin and PVA, for fecal transport*
1	Mailer, dual, for shipping transport medium w/specimen
2	Bags, plastic, for shipping transport medium w/ specimen
1	Requisition, DCH-0583, for specimens submitted to MDCH
1	Label, shipping
1	Directions, DCH-0596, for collection of clinical specimen

- Transport media must be checked for expiration date.

Foodborne Illness

USE OF TEST: For the diagnosis of foodborne illness due to the pathogens described below.

TEST PERFORMED: Lansing M-F (*Salmonella* spp., *Shigella* spp., *E. coli* O157:H7, *Campylobacter jejuni*, *Staphylococcus aureus*, *Bacillus cereus*, *Clostridium perfringens*, *Listeria monocytogenes* or *Yersinia enterocolitica*)

*****Regional Laboratories M-F(*Salmonella* spp., *Shigella* spp., *E. coli* O157:H7 or *Campylobacter jejuni*)

ANALYTIC TIME: Negative - four days. If toxin testing and/or plate counts are required, add up to an additional three days.

INTERPRETATION: The presence of any of the specified microorganisms in clinically significant amounts in conjunction with epidemiologic evidence incriminating a food vehicle of food borne illness is a significant finding.

SPECIMEN TYPE: Foods (kept in original containers if possible), feces in transport media.

VOLUME: Feces, 15-25 grams; foods, at least 0.5 cup of each specimen (15-25 grams)

UNIT NUMBER: Unit 46

CONTAINER: Sterile, wide-mouth, screw-cap containers for foods, other appropriate sterile containers for feces (Unit 1)

FORM NUMBER: Lansing-DCH 0586 [FB 100], Upper Peninsula DCH 0572 [FB 100H] *****Regional Laboratories-DCH 0567

NOTE

1. All specimens and foods not already frozen should be held under refrigerator temperatures and **NOT** frozen. Transport all specimens to the laboratory as rapidly as possible (by courier or by bus) - do not wait until the end of the epidemiologic investigation. **Do not rely upon the mail services**.

2. Stools for *Clostridium perfringens*, *Bacillus cereus*, and *Staphylococcus aureus*, must be accompanied by a sample of the food consumed by the patient.

3. All testing for food borne illness MUST be arranged with MDCH Communicable Disease Epidemiology Division (517/335-8165) and your MDCH *****Regional Laboratory prior to specimen transport. Only those specimens epidemiologically linked to the outbreak will be tested. No testing will be performed unless there are at least two individuals who do not reside in the same household involved.

4. Specimens received at the laboratory without epidemiologic data will be held and refrigerated for two weeks. If additional information is not received in that time, the specimens will be destroyed and the results will be sent out as "Unacceptable due to lack of epidemiologic findings."

5. Testing fish for (scomboid, ciguatera) toxin is not available at MDCH or CDC. Please contact the Michigan Department of Agriculture (517/337-5051).

***The City of Detroit Health Department, Kalamazoo County Human Services Department, Kent County Health Department, Saginaw Department of Public Health and the MDCH Upper Peninsula Laboratory participate in the MDCH Regional Laboratory System. Please contact the Laboratory located at these facilities for more information.**

Michigan Commercial Laboratories Providing Food Testing Services*

Biosan Laboratories, Inc. 1950 Tobsal Court Warren, MI 48091 TX: (810) 755-8970	Dr. Harold Rossman, President Jim Buzonic, Manager E. coli, Listeria, Salmonella, Staph, liquid water testing
Fettig Laboratories 900 Godfrey, SW Grand Rapids, MI 49503 TX: (616) 245-3000	Patricia J. Fettig, President Food microbiology, chemical, sanitation, air quality, forensic work concerning product tampering
Garrett Laboratories 408 N. Third Street Niles, MI 49120 1-800-336-3201 TX: (616) 683-3200 Fax: 888-336-3201	Robert Garrett, President Food microbiology, water
Great Lakes Scientific, Inc. 2847 Lawrence Avenue Stevensville, MI 49127 TX: (616) 429-1000	Dr. Wayne Gleiber, President Food microbiology, water
S & J Laboratories 4669 Executive Drive Portage, MI 49002 TX: (616) 324-7383	Dr. C.C. Sheree Lin, President USDA certified Food microbiology, some pharmaceutical Prefers not to test for individuals
University Laboratories, Inc. 38930 Grand River Avenue Novi, MI 48375 TX: (248) 489-8000	Bijan Sedghi Chemical testing of food, but no micro testing

*This list is provided by the Michigan Department of Agriculture, Food and Dairy Division. The department does not endorse any private testing laboratory in the state, and this list may not be complete and inclusive.